

Padgett, Marianne

From: Bentley, Mark [MBentley@LUCE.com]
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To: Padgett, Marianne
Subject: 10/566,334 for interview on 6/23 @ 10am
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Examiner Padgett,

Please see the attached proposed claims for discussion at our interview on 6/23 @ 10am. Thank you.

Mark Bentley
Registered Patent Attorney
Luce, Forward, Hamilton & Scripps LLP
2050 Main Street, Suite 600 | Irvine, CA 92614
Tel: (949) 241-8963 | Fax: (949) 251-5828 | E-mail: MBentley@Luce.com

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**PROPOSED AMENDMENTS AND REMARKS
FOR PURPOSE OF AGENT-EXAMINER INTERVIEW
DO NOT ENTER CLAIMS**

AMENDMENTS TO THE CLAIMS

Claim 1 (Currently Amended): A method for providing a hydrogen separation membrane ~~upon~~ upon a substrate, comprising;

providing a ~~the~~ the substrate having at least one surface; and

~~subjecting said at least one surface to at least one surface treatment comprising a polishing step whereby the at least one surface is smoothed and whereby bulk properties of the substrate remain unchanged;~~

disposing upon said at least one surface a composition; and

~~forming a leak-tight coating on said at least one surface of the substrate by a laser direct-write process~~ utilizing said composition, wherein said ~~leak-tight~~ coating provides permeance of hydrogen therethrough, thereby forming said hydrogen separation membrane ~~upon~~ upon said substrate;

wherein said composition is a metallic ink having a metallic component and a carrier component, said metallic component comprising at least at least one of palladium, a palladium alloy, and a palladium and silver alloy.

Claim 2 (Cancelled).

Claim 3 (Currently Amended): The method of claim 1, wherein said composition providing said ~~leak-tight~~ coating is comprised of at least one of palladium or palladium alloy.

Claim 4 (Original): The method of claim 1, wherein said substrate is a porous substrate.

Claim 5 (Cancelled).

Claim 6 (Cancelled).

Claim 7 (Cancelled).

Claim 8 (Currently Amended): The method of claim 5 1, further comprising the step of providing a diffusion barrier upon said at least one surface after subjecting said at least one surface to said surface treatment.

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Claim 9 (Original): The method of claim 8, further comprising the step of etching said provided diffusion barrier prior to disposing said composition upon said at least one surface.

Claim 10 (Original): The method of claim 6, wherein said polishing step utilizes a method selected from the group consisting of shot peening, ion-beam treatment, plasma deposition of metals and vapor deposition of metals.

Claim 11 (Original): The method of claim 3 4, wherein said porous substrate is a porous metallic substrate.

Claim 12 (Original): The method of claim 9, wherein said etching step employs etching with at least one of nitric acid, hydrochloric acid and pickling solutions.

Claim 13 (Currently Amended): The method of claim 1, further comprising ~~the step of~~ subjecting said ~~leak tight~~ coating to thermal processing.

Claim 14 (Currently Amended): The method of claim 13, wherein ~~said steps of disposing, forming the disposing upon said at least one surface the composition, the forming the coating, and thermally processing the thermal processing~~ are successively repeated providing a plurality of layers of said [[leak-tight-]] coating, whereby said hydrogen separation membrane includes said plurality of layers.

Claim 15 (Original): The method of claim 13 or 14, wherein said thermal processing includes at least one of sintering and bake out of organics.

Claim 16 (Currently Amended): The method of claim 1, wherein said ~~leak tight~~ coating providing said hydrogen separation membrane, disposed upon said substrate, is less than about 20 microns thick.

Claim 17 (Currently Amended): The method of claim 1, wherein said ~~leak tight~~ coating providing said hydrogen separation membrane, disposed upon said substrate, is about 2 to about 10 microns thick.

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Claim 18 (Currently Amended): The method of claim 1, wherein said ~~leak~~^{tight} coating providing said hydrogen separation membrane, disposed upon said substrate, is about 5 to about 10 microns thick.

Claim 19 (Cancelled).

Claim 20 (Cancelled).

Claim 21 (Currently Amended): The method of claim ~~19~~ 1, wherein said metallic component of said metallic ink is produced by an aerosol decomposition process.

Claim 22 (Currently Amended): The method of claim ~~20~~ 1, wherein said metallic component has a palladium content of about 70 to about 78% by weight.

Claim 23 (Currently Amended): The method of claim ~~20~~ 1, wherein said metallic component has a palladium content of about 75 to 77% by weight.

Claim 24 (Cancelled).

Claim 25 (Currently Amended): The method of claim ~~24~~ 1, wherein said metallic component of said metallic ink comprises about 25% palladium and silver mix and about 75% carrier, by weight respectively, wherein said palladium and silver mix is provided in a ratio of about 75% palladium to about 25% silver, by weight respectively.

Claim 26 (Currently Amended): The method of claim ~~24~~ 1, wherein said metallic component of said metallic ink comprises about 5% to 50% palladium and silver mix and about 50% to 95% carrier, by weight respectively, wherein said palladium and silver mix is provided in a ratio of about 70% to 78% palladium to about 22% to 30% silver, by weight respectively.

Claim 27 (Original): The method of claim 15, wherein said thermal processing is carried out in an atmosphere having low partial pressure of oxygen.

Claim 28 (Currently Amended): The method of claim 15, wherein said thermal processing is carried out in a lean hydrogen gas atmosphere having less than about 10% hydrogen by weight.

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Claim 29 (Currently Amended): A hydrogen separation membrane ~~reformer~~ comprising:

a ~~thin leak tight~~ coating disposed upon a substrate; ;

wherein said ~~leak tight~~ coating transports hydrogen and said ~~thin leak tight~~ coating is comprised of at least one of palladium, palladium alloys or palladium and silver alloy;

wherein the substrate is of a porous metal, a surface thereof being polished by a surface treatment whereby the at least one surface is smoothed and whereby bulk properties of the substrate remain unchanged;

wherein said coating is provided to said substrate by a laser direct-write process utilizing a metallic ink having a metallic component and a carrier component, said metallic component comprising at least at least one of palladium, a palladium alloy, and a palladium and silver alloy.

Claim 30 (Currently Amended): The ~~reformer~~ hydrogen separation membrane of claim 29, wherein said ~~thin leak tight~~ coating is formed on a porous substrate.

Claim 31 (Currently Amended): The ~~reformer~~ hydrogen separation membrane of claim 30, wherein said substrate is a porous metal ~~substrates~~ substrate.

Claim 32 (Cancelled).

Claim 33 (Currently Amended): The ~~reformer~~ hydrogen separation membrane of claim 32 29, wherein said polished substrate is treated to include a diffusion barrier between said polished substrate and said ~~leak tight~~ coating.

Claim 34 (Currently Amended): The ~~reformer~~ hydrogen separation membrane of claim 33, wherein said diffusion barrier is etched.

Claim 35 (Currently Amended): The ~~reformer~~ hydrogen separation membrane of claim 32 29, wherein said polishing is accomplished by at least one of shot peening, ion-beam treatment, plasma deposition of metals and vapor deposition of metals.

Claim 36 (Cancelled).

Claim 37 (Currently Amended): The ~~reformer~~ hydrogen separation membrane of claim 29, wherein said ~~thin leak tight~~ coating has a thickness of less than about 20 microns.

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Claim 38 (Currently Amended): The ~~reformer~~ hydrogen separation membrane of claim 29, wherein said ~~thin leak tight~~ coating has a thickness of between about 2 to 10 microns.

Claim 39 (Cancelled).

Claim 40 (Currently Amended): The ~~reformer~~ hydrogen separation membrane of claim 39, wherein said metallic component of said metallic ink is provided by an aerosol decomposition process.

Claim 41 (Currently Amended): The ~~reformer~~ hydrogen separation membrane of claim 39, wherein said metallic component of said ink is comprised of an alloy having between about 70 to about 78% palladium by weight.

Claim 42 (Currently Amended): The ~~reformer~~ hydrogen separation membrane of claim 39, wherein said metallic component of said ink is comprised of an alloy having between about 75 to about 77% palladium by weight.

Claim 43 (Cancelled).

Claim 44 (Cancelled).

Claim 45 (Currently Amended): The ~~reformer~~ hydrogen separation membrane of claim 44, wherein said metallic component of said metallic ink is comprised of about 25% palladium and silver mix and about 75% carrier, by weight respectively, wherein said palladium and silver mix is provided in a ratio of about 75% palladium to about 25% silver, by weight respectively.

Claim 46 (Currently Amended): The ~~reformer~~ hydrogen separation membrane of claim 44, wherein said metallic component of said metallic ink is comprised of about 50% palladium and silver mix and about 50% carrier, by weight respectively, wherein said palladium and silver mix is provided in a ratio of about 70% palladium to about 30% silver, by weight respectively.

Claim 47 (Original): The method of claim 13 or 14, wherein said thermal processing includes at least one of organics bake out and localized sintering of the coating and not an underlying support, wherein said localized sintering of the coating utilizes an ion or laser beam.

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Claim 48 (Currently Amended): The method of claim 2 1, wherein said substrate is cylindrical or tubular.

Claim 49 (Currently Amended): The ~~reformer~~ hydrogen separation membrane of claim 36 29, ~~wherein said reformer~~ wherein said substrate is cylindrical or tubular.

Rejections under 35 U.S.C. §112

Claims 1-49 were rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

As a preliminary matter, it is noted that the rejections reflect the International Preliminary Report on Patentability from the corresponding PCT case (PCT/US2004/024683). It should be noted that the applicable law differs between PCT applications and non-provisional applications before the USPTO. Objections made under PCT Rule 66.2(a)(v) do not necessarily give rise to rejections under 35 U.S.C. 112. Accordingly, reconsideration of each and every claim is requested with thorough analysis with respect to applicable law in the United States, with adequate support for any such rejections properly set forth.

References to “leak-tight” have been removed from the claims.

In claim 29, the “membrane reformer” refers to a device—not a process. The body of the claim recites at least one component (the “leak-tight coating disposed upon a substrate”) of the membrane reformer. Accordingly, it is implied that other, unrecited components may be combined with those recited to define the membrane reformer. Applicant is unaware of any rule or law that requires a device claim to expressly recite every component that could be implemented to perform a function inferred by the Examiner. Indication of such rule or law, if any exists, is greatly appreciated.

Claim 27 has been cancelled. The modifier “thin” in claim 29 has been removed.

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Claims 2, 13, and 14 have been amended to clarify references to antecedents of “forming a leak-tight coating” and “thermal processing,” *inter alia*.

Claim 7 has been cancelled.

With respect to claim 12, specific etchants are recited as applied to the etching step of claim 9. As recited in claim 9, the etching step is performed on the diffusion barrier. Thus, it is respectfully submitted that claim 12 sufficiently recites the materials acting as well as the materials being acted upon.

Claim 11 has been amended to depend from claim 4.

With regard to claim 34, the Specification states: “Such etching provides surface roughness to provide better adhesion of the coating of metallic components of the metallic inks to the substrate surface or, if so provided, to a diffusion barrier layer provided upon the substrate surface.” [Specification, Paragraph 0075]. It is respectfully submitted that an “etched” feature provides specific structure and physical characteristics to the diffusion barrier.

With regard to claim 10 or 35, “polishing” is used throughout the specification and embodied by examples including “shot peening, ion-beam treatment, plasma deposition of metals and vapor deposition of metals.” [See Claims 10 and 35; Specification, paragraph 0014, 0020, and 0063]. Each of these are characterized by the common feature that a surface is made more smooth thereby, as would be recognized by one having ordinary skill in the art. It is acknowledged in the Office Action that plasma or vapor deposition “result in a coating of shiny metal or a very smooth or planarized surface.” [See Office Action, page 4]. While the Office Action asserts that this is contrary to the Examiner’s interpretation of “polishing”, Applicant submits that usage of the word “polishing” has an ordinary meaning that includes smoothing by reformation of material, smoothing by removal of material, and smoothing by addition of material (e.g., shoe “polish”). To the extent that this definition departs from any plain meaning, the Specification uses the term to include such methods for providing a smooth or planarized surface. Accordingly “polishing” is defined by such processes inasmuch as the Specification

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uses the term to include the same. It is noted that a patentee may be his own lexicographer, giving meaning to words according to their usage in the Specification. MPEP 2111.01.

With regard to claims 16, 28, and 37 reciting the phrase “less than about,” it is well within acceptable USPTO guidelines and common practice before the USPTO. Its usage does not violate 35 U.S.C. 112. See *In re Geisler*, 116 F.3d 1465, 1471, 43 USPQ2d 1362, 1366 (Fed. Cir. 1997).

Other amendments have been made that may address issues raised in the Office Action. Reconsideration is kindly requested.